SEQUENCE LISTING

<110> King, Te Piao

<120> CLONING AND RECOMBINANT PRODUCTION OF POLISTINAE VENOM ENZYMES, SUCH AS PHOSPHOLIPASE AND HYALURONIDASE, AND IMMUNOLOGICAL THERAPIES BASED THEREON

<130> 02313/100F138-US2

<140> TBA
<141> 2003-10-17

<150> US 09/806,658
<151> 2001-03-30

<150> PCT/US99/23211
<151> 1999-10-01

<150> US 09/166,205
<151> 1998-10-01

<160> 12

<170> PatentIn version 3.2

<210> 1
<211> 1048
<212> DNA
<213> Polistes annularis

<400> 1
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tctccggatt gtacttttaa tgagaaagat atagtattct atgtttactc aagggataag 120

cgagatggta ttattcttaa gaaagaaact ttaacgaatt acgatctgtt tacaaagtct 180

acaatatcaa aacaagttgt atttcttata catggtttcc tttcaactgg gaataatgaa 240

aacttcgttg ctatgtcgaa agctttaata gaaaaagatg attttcttgt aatttcggtc 300

gactggaaga agggtgcttg taatgctttt gcttcaacaa aggatgcttt gggttattcc 360

aaagccgttg gaaacacacg tcacgttgga aaatttgtag ctgattttac aaaactactt 420

gtagaaaaat ataaagtgct gatatcaaat atacgattga tcgggcatag tttgggcgcg 480

catacttcag gttttgcggg aaaagaagtt caaaagttaa aattaggaaa atacaaggaa 540

attatcgggc ttgatcctgc tggaccgtat tttcatcgga gtgactgtcc ggacagactt 600

tgcgtaacag acgcagaata tgttcaagtt atacatacat caatcatatt aggagtatat 660

tataatgttg gtagcgttga tttctacgtg aattatggaa aaaatcaacc tggttgcaat 720

gaaccatcct gctctcatac gaaagccgtg aaatatctga ctgagtgcat aaaacatgaa 780

tgttgtttaa ttggaacacc atggaagaaa tatttcagca ctccaaaacc aatttcccag 840

tgcagaggag acacctgtgt ttgcgttgga ttgaatgcaa aaagttatcc tgctagaggc 900

gcattttatg caccggttga agcaaatgca ccttattgcc ataacgaggg gattaaactt 960

taattataaa caaaagtcaa tgtacacaaa aatgtatcta ttgatgaata ttaaatgaat 1020

aaacgaacag tcaaataaaa aaaaaaaa 1048

<210> 2
<211> 320
<212> PRT
<213> Polistes annularis

<400> 2

Ile Cys Phe Leu Leu Asp Asp Ser Thr Thr Phe Arg Asn Gly Thr Leu
1 5 10 15

Asn Arg Gly Met Ser Pro Asp Cys Thr Phe Asn Glu Lys Asp Ile Val
20 25 30

Phe Tyr Val Tyr Ser Arg Asp Lys Arg Asp Gly Ile Ile Leu Lys Lys
35 40 45

Glu Thr Leu Thr Asn Tyr Asp Leu Phe Thr Lys Ser Thr Ile Ser Lys
50 55 60

Gln Val Val Phe Leu Ile His Gly Phe Leu Ser Thr Gly Asn Asn Glu
65 70 75 80

Asn Phe Val Ala Met Ser Lys Ala Leu Ile Glu Lys Asp Asp Phe Leu
85 90 95

Val Ile Ser Val Asp Trp Lys Lys Gly Ala Cys Asn Ala Phe Ala Ser
100 105 110

Thr Lys Asp Ala Leu Gly Tyr Ser Lys Ala Val Gly Asn Thr Arg His
115 120 125

Val Gly Lys Phe Val Ala Asp Phe Thr Lys Leu Leu Val Glu Lys Tyr
130 135 140

Lys Val Leu Ile Ser Asn Ile Arg Leu Ile Gly His Ser Leu Gly Ala
145 150 155 160

His Thr Ser Gly Phe Ala Gly Lys Glu Val Gln Lys Leu Lys Leu Gly
165 170 175

Lys Tyr Lys Glu Ile Ile Gly Leu Asp Pro Ala Gly Pro Tyr Phe His
180 185 190

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Arg Ser Asp Cys Pro Asp Arg Leu Cys Val Thr Asp Ala Glu Tyr Val
        195                 200                 205

Gln Val Ile His Thr Ser Ile Ile Leu Gly Val Tyr Tyr Asn Val Gly
    210                 215                 220

Ser Val Asp Phe Tyr Val Asn Tyr Gly Lys Asn Gln Pro Gly Cys Asn
225                 230                 235                 240

Glu Pro Ser Cys Ser His Thr Lys Ala Val Lys Tyr Leu Thr Glu Cys
                245                 250                 255

Ile Lys His Glu Cys Cys Leu Ile Gly Thr Pro Trp Lys Lys Tyr Phe
            260                 265                 270

Ser Thr Pro Lys Pro Ile Ser Gln Cys Arg Gly Asp Thr Cys Val Cys
        275                 280                 285

Val Gly Leu Asn Ala Lys Ser Tyr Pro Ala Arg Gly Ala Phe Tyr Ala
    290                 295                 300

Pro Val Glu Ala Asn Ala Pro Tyr Cys His Asn Glu Gly Ile Lys Leu
305                 310                 315                 320
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<210> 3
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<212> DNA
<213> Polistes annularis

<400> 3

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attctttcca gatcgaattg tgaaagatcc aaaagaccga aaagggtctt cagcatttat    120

tggaacgttg ctacctttat gtgccaccaa tatggcatga atttcgacga ggtgacagat    180

tttaatatca aacataattc taaggacaat tttcgcggtg aaactatatc aatttattac    240

gatcctggaa aatttccagc attgatgcca ctaaaaaatg gtaattatga ggaaagaaac    300

ggaggggttc ctcagcgagg taacatcacg atacatttgc aacaatttaa cgaagatttg    360

gataaaatga caccggataa aaatttcggt ggtatcggtg taatcgattt cgaaagatgg    420

aaaccgattt tccgacagaa ttggggtaac acggaaatac ataagaaata ttctattgaa    480

ctcgttcgga aagaacatcc aaagtggagc gaatcgatga tcgaagcgga agctacgaaa    540

aagttcgaga aatatgcgag atatttcatg gaagaaactt tgaaattggc aaaaaagact    600

aggaaaaggg ctaagtgggg ttattacgga tttccttact gctataacgt aacaccgaat    660
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aatcctggcc cggattgcga tgctaaagcg acaatcgaga acgatagact gtcgtggatg 720

tacaataatc aagaaatact ttttccatcc gtctacgtga gacatgaaca aaaaccggag 780

gaaagggttt acctagtgca aggtagaatt aaagaagctg ttaggatatc gaataattta 840

gaacattcac ctagtgtgct tgcttattgg tggtacgtgt atcaggacaa gatggacatt 900

tacctaagcg agaccgacgt ggaaaagact ttccaagaga tagtgactaa tggtggggat 960

ggtatcataa tatggggtag ctcgtccgat gttaacagcc taagtaaatg taagagattg 1020

agagagtacc tgttaaacac tttaggaccg ttcgcggtta atgtaacaga aactgtcaac 1080

ggaagatcat ccctaaactt ctaaaataat cgataacgcc taatcacgtc gatgatgatt 1140

attagggtgt tcttcggtga ttggtttgat ctcactgaaa agacttttcg ttaaaaaaca 1200

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aaaaaaaaaa aaa 1273

<210> 4
<211> 367
<212> PRT
<213> Polistes annularis

<400> 4

Tyr Val Ser Leu Ser Pro Asp Ser Val Phe Asn Ile Ile Thr Asp Asp
1 5 10 15

Ile Ser His Gln Ile Leu Ser Arg Ser Asn Cys Glu Arg Ser Lys Arg
20 25 30

Pro Lys Arg Val Phe Ser Ile Tyr Trp Asn Val Pro Thr Phe Met Cys
35 40 45

His Gln Tyr Gly Met Asn Phe Asp Glu Val Thr Asp Phe Asn Ile Lys
50 55 60

His Asn Ser Lys Asp Asn Phe Arg Gly Glu Thr Ile Ser Ile Tyr Tyr
65 70 75 80

Asp Pro Gly Lys Phe Pro Ala Leu Met Pro Leu Lys Asn Gly Asn Tyr
85 90 95

Glu Glu Arg Asn Gly Gly Val Pro Gln Arg Gly Asn Ile Thr Ile His
100 105 110

Leu Gln Gln Phe Asn Glu Asp Leu Asp Lys Met Thr Pro Asp Lys Asn
115 120 125

```
Phe Gly Gly Ile Gly Val Ile Asp Phe Glu Arg Trp Lys Pro Ile Phe
    130                 135                 140

Arg Gln Asn Trp Gly Asn Thr Glu Ile His Lys Lys Tyr Ser Ile Glu
145                 150                 155                 160

Leu Val Arg Lys Glu His Pro Lys Trp Ser Glu Ser Met Ile Glu Ala
                165                 170                 175

Glu Ala Thr Lys Lys Phe Glu Lys Tyr Ala Arg Tyr Phe Met Glu Glu
            180                 185                 190

Thr Leu Lys Leu Ala Lys Lys Thr Arg Lys Arg Ala Lys Trp Gly Tyr
        195                 200                 205

Tyr Gly Phe Pro Tyr Cys Tyr Asn Val Thr Pro Asn Asn Pro Gly Pro
    210                 215                 220

Asp Cys Asp Ala Lys Ala Thr Ile Glu Asn Asp Arg Leu Ser Trp Met
225                 230                 235                 240

Tyr Asn Asn Gln Glu Ile Leu Phe Pro Ser Val Tyr Val Arg His Glu
                245                 250                 255

Gln Lys Pro Glu Glu Arg Val Tyr Leu Val Gln Gly Arg Ile Lys Glu
            260                 265                 270

Ala Val Arg Ile Ser Asn Asn Leu Glu His Ser Pro Ser Val Leu Ala
        275                 280                 285

Tyr Trp Trp Tyr Val Tyr Gln Asp Lys Met Asp Ile Tyr Leu Ser Glu
    290                 295                 300

Thr Asp Val Glu Lys Thr Phe Gln Glu Ile Val Thr Asn Gly Gly Asp
305                 310                 315                 320

Gly Ile Ile Ile Trp Gly Ser Ser Ser Asp Val Asn Ser Leu Ser Lys
                325                 330                 335

Cys Lys Arg Leu Arg Glu Tyr Leu Leu Asn Thr Leu Gly Pro Phe Ala
            340                 345                 350

Val Asn Val Thr Glu Thr Val Asn Gly Arg Ser Ser Leu Asn Phe
        355                 360                 365
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<210> 5
<211> 114
<212> DNA
<213> Polistes annularis

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agaaaaattt ttaaaaatat attactgaag tatgaaataa aaactttata cttt 114

<210> 6
<211> 127
<212> DNA
<213> Polistes annularis

<400> 6
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tatatcctat gccttgttat atgatttcgg agttagacac tattattttt aaataatttt 120

tacatta 127

<210> 7
<211> 317
<212> PRT
<213> Dolichovespula maculata

<400> 7

Arg Leu Ile Met Phe Val Gly Asp Pro Ser Ser Ser Asn Glu Leu Asp
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Arg Phe Ser Val Cys Pro Phe Ser Asn Asp Thr Val Lys Met Ile Phe
20 25 30

Leu Thr Arg Glu Asn Arg Lys His Asp Phe Tyr Thr Leu Asp Thr Met
35 40 45

Asn Arg His Asn Glu Phe Lys Lys Ser Ile Ile Lys Arg Pro Val Val
50 55 60

Phe Ile Thr His Gly Phe Thr Ser Ser Ala Thr Glu Lys Asn Phe Val
65 70 75 80

Ala Met Ser Glu Ala Leu Met His Thr Gly Asp Phe Leu Ile Ile Met
85 90 95

Val Asp Trp Arg Met Ala Ala Cys Thr Asp Glu Tyr Pro Gly Leu Lys
100 105 110

Tyr Met Phe Tyr Lys Ala Ala Val Gly Asn Thr Arg Leu Val Gly Asn

```
        115                 120                 125

Phe Ile Ala Met Ile Ala Lys Lys Leu Val Glu Gln Tyr Lys Val Pro
    130                 135                 140

Met Thr Asn Ile Arg Leu Val Gly His Ser Leu Gly Ala His Ile Ser
145                 150                 155                 160

Gly Phe Ala Gly Lys Arg Val Gln Glu Leu Lys Leu Gly Lys Phe Ser
                165                 170                 175

Glu Ile Ile Gly Leu Asp Pro Ala Gly Pro Ser Phe Lys Lys Asn Asp
            180                 185                 190

Cys Ser Glu Arg Ile Cys Glu Thr Asp Ala His Tyr Val Gln Ile Leu
        195                 200                 205

His Thr Ser Ser Asn Leu Gly Thr Glu Arg Thr Leu Gly Thr Val Asp
    210                 215                 220

Phe Tyr Ile Asn Asn Gly Ser Asn Gln Pro Gly Cys Arg Tyr Ile Ile
225                 230                 235                 240

Gly Glu Thr Cys Ser His Thr Arg Ala Val Lys Tyr Phe Thr Glu Cys
                245                 250                 255

Ile Arg Arg Glu Cys Cys Leu Ile Gly Val Pro Gln Ser Lys Asn Pro
            260                 265                 270

Gln Pro Val Ser Lys Cys Thr Arg Asn Glu Cys Val Cys Val Gly Leu
        275                 280                 285

Asn Ala Lys Lys Tyr Pro Lys Arg Gly Ser Phe Tyr Val Pro Val Glu
    290                 295                 300

Ala Glu Ala Pro Tyr Cys Asn Asn Asn Gly Lys Ile Ile
305                 310                 315
```

<210> 8
<211> 300
<212> PRT
<213> Vespula vulgaris

<400> 8

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Gly Pro Lys Cys Pro Phe Asn Ser Asp Thr Val Ser Ile Ile Ile Glu
1               5                   10                  15
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```
Thr Arg Glu Asn Arg Asn Arg Asp Leu Tyr Thr Leu Gln Thr Leu Gln
            20                  25                  30

Asn His Pro Glu Phe Lys Lys Lys Thr Ile Thr Arg Pro Val Val Phe
        35                  40                  45

Ile Thr His Gly Phe Thr Ser Ser Ala Ser Glu Thr Asn Phe Ile Asn
    50                  55                  60

Leu Ala Lys Ala Leu Val Asp Lys Asp Asn Tyr Met Val Ile Ser Ile
65                  70                  75                  80

Asp Trp Gln Thr Ala Ala Cys Thr Asn Glu Ala Ala Gly Leu Lys Tyr
                85                  90                  95

Leu Tyr Tyr Pro Thr Ala Ala Arg Asn Thr Arg Leu Val Gly Gln Tyr
            100                 105                 110

Ile Ala Thr Ile Thr Gln Lys Leu Val Lys His Tyr Lys Ile Ser Met
        115                 120                 125

Ala Asn Ile Arg Leu Ile Gly His Ser Leu Gly Ala His Ala Ser Gly
    130                 135                 140

Phe Ala Gly Lys Lys Val Gln Glu Leu Lys Leu Gly Lys Tyr Ser Glu
145                 150                 155                 160

Ile Ile Gly Leu Asp Pro Ala Arg Pro Ser Phe Asp Ser Asn His Cys
                165                 170                 175

Ser Glu Arg Leu Cys Glu Thr Asp Ala Glu Tyr Val Gln Ile Ile His
            180                 185                 190

Thr Ser Asn Tyr Leu Gly Thr Glu Lys Thr Leu Gly Thr Val Asp Phe
        195                 200                 205

Tyr Met Asn Asn Gly Lys Asn Gln Pro Gly Cys Gly Arg Phe Phe Ser
    210                 215                 220

Glu Val Cys Ser His Ser Arg Ala Val Ile Tyr Met Ala Glu Cys Ile
225                 230                 235                 240

Lys His Glu Cys Cys Leu Ile Gly Ile Pro Lys Ser Lys Ser Ser Gln
                245                 250                 255
```

```
Pro Ile Ser Ser Cys Thr Lys Gln Glu Cys Val Cys Val Gly Leu Asn
            260                 265                 270

Ala Lys Lys Tyr Thr Ser Arg Gly Ser Phe Tyr Val Pro Val Glu Ser
        275                 280                 285

Thr Val Pro Phe Cys Asn Asn Lys Gly Lys Ile Ile
    290                 295                 300
```

<210> 9
<211> 94
<212> DNA
<213> Polistes annularis

<400> 9
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ctattgtaaa ttatctatcg attgtttagg caaa 94

<210> 10
<211> 347
<212> PRT
<213> Apis melliferis

<400> 10

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Asn Asn Lys Thr Val Arg Glu Phe Asn Val Tyr Trp Asn Val Pro Thr
1               5                   10                  15

Phe Met Cys His Lys Tyr Gly Leu Arg Phe Glu Glu Val Ser Glu Lys
            20                  25                  30

Tyr Gly Ile Leu Gln Asn Trp Met Asp Lys Phe Arg Gly Glu Glu Ile
        35                  40                  45

Ala Ile Leu Tyr Asp Pro Gly Met Phe Pro Ala Leu Leu Lys Asp Pro
    50                  55                  60

Asn Gly Asn Val Val Ala Arg Asn Gly Gly Val Pro Gln Leu Gly Asn
65                  70                  75                  80

Leu Thr Lys His Leu Gln Val Phe Arg Asp His Tyr Ile Asn Gln Ile
                85                  90                  95

Pro Asp Lys Ser Phe Pro Gly Val Gly Val Ile Asp Phe Glu Ser Trp
            100                 105                 110

Arg Pro Ile Phe Arg Gln Asn Trp Ala Ser Leu Gln Pro Tyr Lys Lys
        115                 120                 125
```

```
Leu Ser Val Glu Val Val Arg Arg Glu His Pro Phe Trp Asp Asp Gln
    130                 135                 140

Arg Val Glu Gln Glu Ala Lys Arg Arg Phe Glu Lys Tyr Gly Gln Leu
145                 150                 155                 160

Phe Met Glu Glu Thr Leu Lys Ala Ala Lys Arg Met Arg Pro Ala Ala
                165                 170                 175

Asn Trp Gly Tyr Tyr Ala Tyr Pro Tyr Cys Tyr Asn Leu Thr Pro Asn
            180                 185                 190

Gln Pro Ser Ala Gln Cys Glu Ala Thr Thr Met Gln Glu Asn Asp Lys
        195                 200                 205

Met Ser Trp Leu Phe Glu Ser Glu Asp Val Leu Leu Pro Ser Val Tyr
    210                 215                 220

Leu Arg Trp Asn Leu Thr Ser Gly Glu Arg Val Gly Leu Val Gly Gly
225                 230                 235                 240

Arg Val Lys Glu Ala Leu Arg Ile Ala Arg Gln Met Thr Thr Ser Arg
                245                 250                 255

Lys Lys Val Leu Pro Tyr Tyr Trp Tyr Lys Tyr Gln Asp Arg Arg Asp
            260                 265                 270

Thr Asp Leu Ser Arg Ala Asp Leu Glu Ala Thr Leu Arg Lys Ile Thr
        275                 280                 285

Asp Leu Gly Ala Asp Gly Phe Ile Ile Trp Gly Ser Ser Asp Asp Ile
    290                 295                 300

Asn Thr Lys Ala Lys Cys Leu Gln Phe Arg Glu Tyr Leu Asn Asn Glu
305                 310                 315                 320

Leu Gly Pro Ala Val Lys Arg Ile Ala Leu Asn Asn Asn Ala Asn Asp
                325                 330                 335

Arg Leu Thr Val Asp Val Ser Val Asp Gln Val
            340                 345
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<210> 11
<211> 331
<212> PRT
<213> Dolichovespula maculata

<400> 11

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Ser Glu Arg Pro Lys Arg Val Phe Asn Ile Tyr Trp Asn Val Pro Thr
1               5                  10                  15

Phe Met Cys His Gln Tyr Gly Leu Tyr Phe Asp Glu Val Thr Asn Phe
            20                  25                  30

Asn Ile Lys His Asn Ser Lys Asp Asp Phe Gln Gly Asp Lys Ile Ser
        35                  40                  45

Ile Phe Tyr Asp Pro Gly Glu Phe Pro Ala Leu Leu Pro Leu Lys Glu
    50                  55                  60

Gly Asn Tyr Lys Ile Arg Asn Gly Gly Val Pro Gln Glu Gly Asn Ile
65                  70                  75                  80

Thr Ile His Leu Gln Arg Phe Ile Glu Asn Leu Asp Lys Thr Tyr Pro
                85                  90                  95

Asn Arg Asn Phe Asn Gly Ile Gly Val Ile Asp Phe Glu Arg Trp Arg
            100                 105                 110

Pro Ile Phe Arg Gln Asn Trp Gly Asn Met Met Ile His Lys Lys Phe
        115                 120                 125

Ser Ile Asp Leu Val Arg Asn Glu His Pro Phe Trp Asp Lys Lys Met
    130                 135                 140

Ile Glu Leu Glu Ala Ser Lys Arg Phe Glu Lys Tyr Ala Arg Leu Phe
145                 150                 155                 160

Met Glu Glu Thr Leu Lys Leu Ala Lys Lys Thr Arg Lys Gln Ala Asp
                165                 170                 175

Trp Gly Tyr Tyr Gly Tyr Pro Tyr Cys Phe Asn Met Ser Pro Asn Asn
            180                 185                 190

Leu Val Pro Asp Cys Asp Ala Thr Ala Met Leu Glu Asn Asp Lys Met
        195                 200                 205

Ser Trp Leu Phe Asn Asn Gln Asn Val Leu Leu Pro Ser Val Tyr Ile
    210                 215                 220

Arg His Glu Leu Thr Pro Asp Gln Arg Val Gly Leu Val Gln Gly Arg
225                 230                 235                 240
```

```
Val Lys Glu Ala Val Arg Ile Ser Asn Asn Leu Lys His Ser Pro Lys
                245                 250                 255

Val Leu Ser Tyr Trp Trp Tyr Val Tyr Gln Asp Asp Thr Asn Thr Phe
            260                 265                 270

Leu Thr Glu Thr Asp Val Lys Lys Thr Phe Gln Glu Ile Ala Ile Asn
        275                 280                 285

Gly Gly Asp Gly Ile Ile Ile Trp Gly Ser Ser Ser Asp Val Asn Ser
    290                 295                 300

Leu Ser Lys Cys Lys Arg Leu Arg Glu Tyr Leu Leu Thr Val Leu Gly
305                 310                 315                 320

Pro Ile Thr Val Asn Val Thr Glu Thr Val Asn
                325                 330
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<210> 12
<211> 331
<212> PRT
<213> Vespula vulgaris

<400> 12

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Ser Glu Arg Pro Lys Arg Val Phe Asn Ile Tyr Trp Asn Val Pro Thr
1               5                   10                  15

Phe Met Cys His Gln Tyr Asp Leu Tyr Phe Asp Glu Val Thr Asn Phe
            20                  25                  30

Asn Ile Lys Arg Asn Ser Lys Asp Asp Phe Gln Gly Asp Lys Ile Ala
        35                  40                  45

Ile Phe Tyr Asp Pro Gly Glu Phe Pro Ala Leu Leu Ser Leu Lys Asp
    50                  55                  60

Gly Lys Tyr Lys Lys Arg Asn Gly Gly Val Pro Gln Glu Gly Asn Ile
65                  70                  75                  80

Thr Ile His Leu Gln Lys Phe Ile Glu Asn Leu Asp Lys Ile Tyr Pro
                85                  90                  95

Asn Arg Asn Phe Ser Gly Ile Gly Val Ile Asp Phe Glu Arg Trp Arg
            100                 105                 110
```

```
Pro Ile Phe Arg Gln Asn Trp Gly Asn Met Lys Ile His Lys Asn Phe
        115                 120                 125

Ser Ile Asp Leu Val Arg Asn Glu His Pro Thr Trp Asn Lys Lys Met
    130                 135                 140

Ile Glu Leu Glu Ala Ser Lys Arg Phe Glu Lys Tyr Ala Arg Phe Phe
145                 150                 155                 160

Met Glu Glu Thr Leu Lys Leu Ala Lys Lys Thr Arg Lys Gln Ala Asp
                165                 170                 175

Trp Gly Tyr Tyr Gly Tyr Pro Tyr Cys Phe Asn Met Ser Pro Asn Asn
            180                 185                 190

Leu Val Pro Glu Cys Asp Val Thr Ala Met His Glu Asn Asp Lys Met
        195                 200                 205

Ser Trp Leu Phe Asn Asn Gln Asn Val Leu Leu Pro Ser Val Tyr Val
    210                 215                 220

Arg Gln Glu Leu Thr Pro Asp Gln Arg Ile Gly Leu Val Gln Gly Arg
225                 230                 235                 240

Val Lys Glu Ala Val Arg Ile Ser Asn Asn Leu Lys His Ser Pro Lys
                245                 250                 255

Val Leu Ser Tyr Trp Trp Tyr Val Tyr Gln Asp Glu Thr Asn Thr Phe
            260                 265                 270

Leu Thr Glu Thr Asp Val Lys Lys Thr Phe Gln Glu Ile Val Ile Asn
        275                 280                 285

Gly Gly Asp Gly Ile Ile Ile Trp Gly Ser Ser Ser Asp Val Asn Ser
    290                 295                 300

Leu Ser Lys Cys Lys Arg Leu Gln Asp Tyr Leu Leu Thr Val Leu Gly
305                 310                 315                 320

Pro Ile Ala Ile Asn Val Thr Glu Ala Val Asn
                325                 330
```